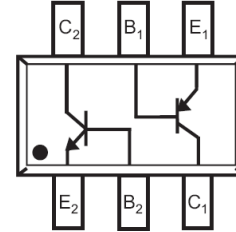


### FEATURES

- Complementary pair.
- Ideal for low power amplification and switching.
- Ultra-Small surface mount package.
- Expitaxial planar die construction.



### APPLICATIONS

- General switching and amplification.

**SOT-363**

### ORDERING INFORMATION

Type No.	Marking	Package Code
MMDT4413	K13	SOT-363

### MAXIMUM RATING-NPN @ Ta=25°C unless otherwise specified

SYMBOL	PARAMETER	VALUE	UNIT
V <sub>CBO</sub>	collector-base voltage	60	V
V <sub>CEO</sub>	collector-emitter voltage	40	V
V <sub>EBO</sub>	emitter-base voltage	6	V
I <sub>C</sub>	collector current -continuous	0.6	A
P <sub>D</sub>	Power dissipation	0.2	W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	625	°C/W
T <sub>J</sub> , T <sub>STG</sub>	Operating and storage junction temperature range	-55 to +150	°C

### MAXIMUM RATING-PNP @ Ta=25°C unless otherwise specified

SYMBOL	PARAMETER	VALUE	UNIT
V <sub>CBO</sub>	collector-base voltage	-40	V
V <sub>CEO</sub>	collector-emitter voltage	-40	V
V <sub>EBO</sub>	emitter-base voltage	-5.0	V
I <sub>C</sub>	collector current -continuous	-0.6	A
P <sub>D</sub>	Power dissipation	0.2	W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	625	°C/W
T <sub>J</sub> , T <sub>stg</sub>	Operating and storage junction temperature range	-55 to +150	°C



# MMDT4413

## Dual Bipolar Transistor(NPN+PNP)



### ELECTRICAL CHARACTERISTICS NPN 4401 Section @ Ta=25°C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	Collector-base breakdown voltage	$I_C=100\mu A, I_E=0$	60		V
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	$I_C=1mA, I_B=0$	40		V
$V_{(BR)EBO}$	Emitter-base breakdown voltage	$I_E=100\mu A, I_C=0$	6		V
$I_{CBO}$	collector cut-off current	$V_{CB}= 30V I_E=0$	-	100	nA
$I_{CEO}$	collector cut-off current	$V_{CE}= 30V I_E=0$	-	100	nA
$I_{EBO}$	emitter cut-off current	$V_{CE}= 5V I_C=0$	-	100	nA
$h_{FE}$	DC current gain	$V_{CE}=1V, I_C= 0.1mA$ $V_{CE}=1V, I_C=1mA$ $V_{CE}=1V, I_C=10mA$ $V_{CE}=1V, I_C=150mA$	20 40 80 100	- - - 300	
$V_{CE(sat)}$	collector-emitter saturation voltage	$I_C=150mA, I_B =15mA$	-	0.4	V
		$I_C=500mA, I_B =50mA$	-	0.75	V
$V_{BE(sat)}$	base-emitter saturation voltage	$I_C=150mA, I_B =15mA$	0.75	0.95	V
		$I_C=500mA, I_B =50mA$	-	1.2	V
$C_{ob}$	Output capacitance	$I_E =0, V_{CB} =5V; f =1MHz$	-	6.5	pF
$f_T$	transition frequency	$I_C=20mA, V_{CE}=10V, f=100MHz$	250	-	MHz
$t_d$	delay time	$V_{CC}=30V, V_{BE}=2.0V$ $I_C=150mA I_{B1}=I_{B2}=15mA$	-	15	ns
$t_r$	rise time		-	20	ns
$t_s$	storage time	$V_{CC}=30V, I_C=150mA$ $I_{B1}=I_{B2}=15mA$	-	225	ns
$t_f$	fall time		-	30	ns



# MMDT4413

## Dual Bipolar Transistor(NPN+PNP)



### ELECTRICAL CHARACTERISTICS PNP 4403 Section @ Ta=25°C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	Collector-base breakdown voltage	$I_C = -100\mu A, I_E = 0$	-40		V
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	$I_C = -1mA, I_B = 0$	-40		V
$V_{(BR)EBO}$	Emitter-base breakdown voltage	$I_E = -100\mu A, I_C = 0$	-5		V
$I_{CBO}$	collector cut-off current	$I_E = 0, V_{CB} = -30V$	-	-0.1	$\mu A$
$I_{CEO}$	collector cut-off current	$I_E = 0, V_{CE} = -30V$	-	-0.1	$\mu A$
$I_{EBO}$	emitter cut-off current	$I_C = 0, V_{EB} = -5V$	-	-0.1	$\mu A$
$h_{FE}$	DC current gain	$V_{CE} = -1V, I_C = -0.1mA$ $V_{CE} = -1V, I_C = -1mA$ $V_{CE} = -1V, I_C = -10mA$ $V_{CE} = -2V, I_C = -150mA$	30 60 100 100	- - - 300	
$V_{CE(sat)}$	collector-emitter saturation voltage	$I_C = -150mA, I_B = -15mA$	-	-0.4	V
		$I_C = -500mA, I_B = -50mA$	-	-0.75	V
$V_{BE(sat)}$	base-emitter saturation voltage	$I_C = -150mA, I_B = -15mA$	-0.75	-0.95	V
		$I_C = -500mA, I_B = -50mA$	-	-1.3	V
$C_{ob}$	Output capacitance	$I_E = 0, V_{CB} = -10V; f = 1MHz$	-	8.5	pF
$f_T$	transition frequency	$I_C = -20mA, V_{CE} = -10V, f = 100MHz$	200	-	MHz
$t_d$	delay time	$V_{CC} = -30V, V_{BE} = -2V, I_C = -150mA$ $I_{B1} = -15mA$	-	15	ns
$t_r$	rise time		-	20	ns
$t_s$	storage time	$V_{CC} = -30V, I_C = -150mA$ $I_{B1} = I_{B2} = -15mA$	-	225	ns
$t_f$	fall time		-	30	ns

### TYPICAL CHARACTERISTICS @ Ta=25°C unless otherwise specified

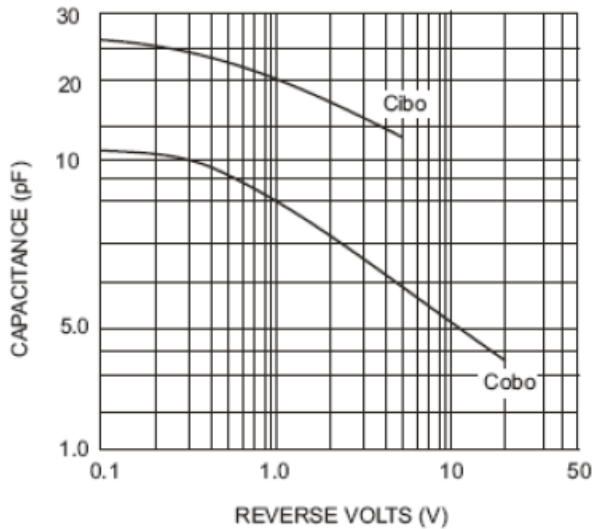


Fig. 1 Typical Capacitance (4401)

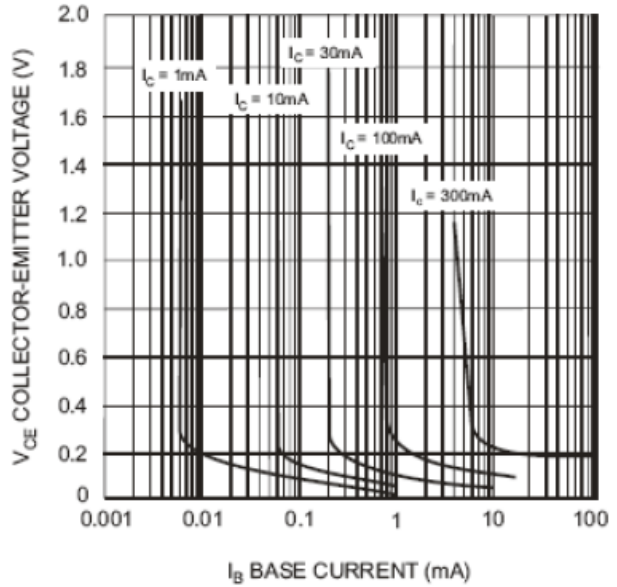


Fig. 2 Typical Collector Saturation Region (4401)

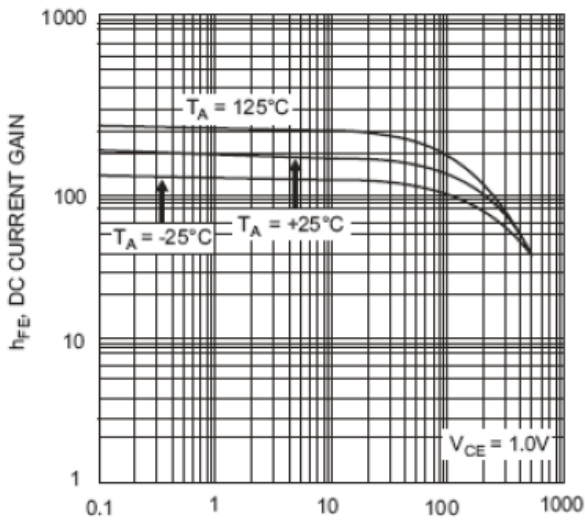


Fig. 3 Typical DC Current Gain vs Collector Current (4401)

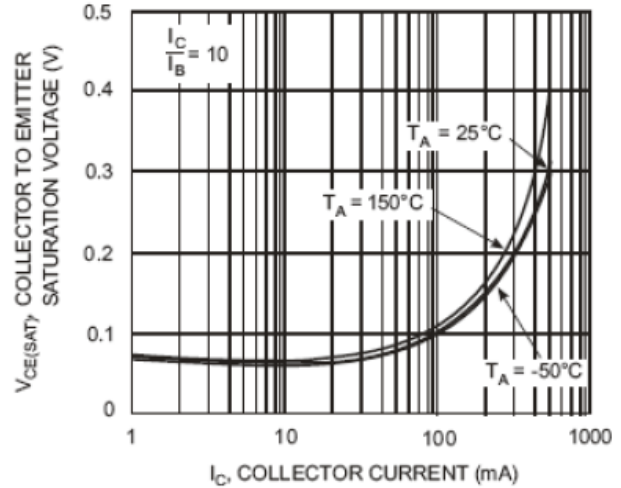
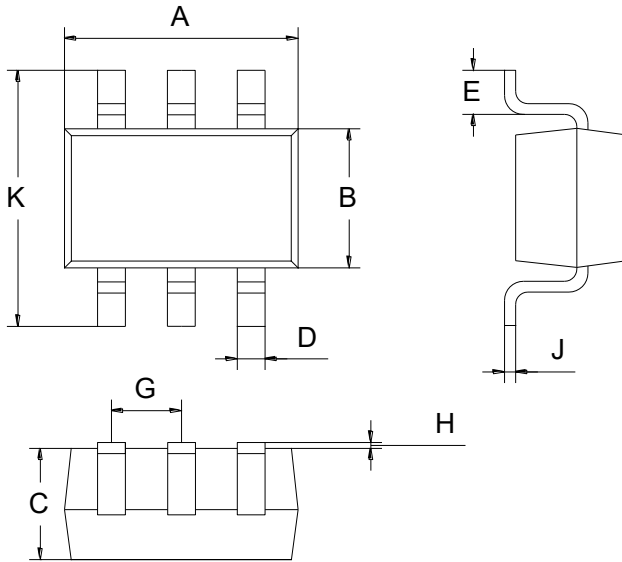


Fig. 4 Collector Emitter Saturation Voltage vs. Collector Current (4401)

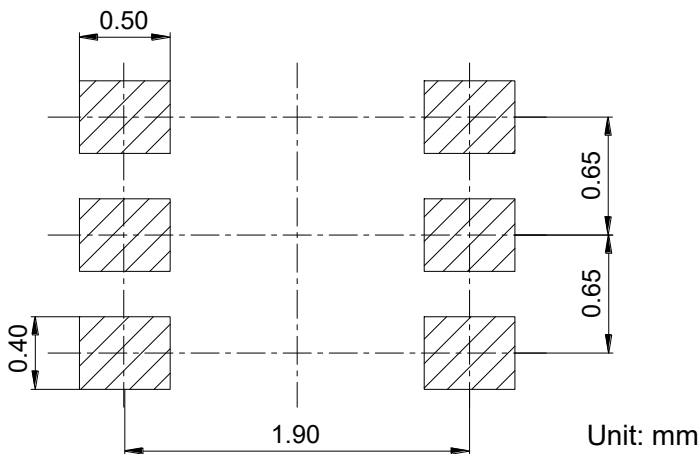
### PACKAGE OUTLINE

Plastic surface mounted package



SOT-363		
Dim	Min	Max
A	2.00	2.20
B	1.15	1.35
C	0.85	1.05
D	0.15	0.35
E	0.25	0.40
G	0.60	0.70
H	0.02	0.10
J	0.05	0.15
K	2.20	2.40
All Dimensions in mm		

### SOLDERING FOOTPRINT



### PACKAGE INFORMATION

Device	Package	Shipping
MMDT4413	SOT-363	3000 pcs / Tape & Reel